Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Ethics, Medicine and Public Health 26 (2023) 100858

Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en

LETTER TO THE EDITOR

The resurgence of polio: The effect of the Covid-19 pandemic on polio eradication

Keywords Covid-19; Poliomyelitis; Re-emergence; Vaccination; Virus

Dear Editor,

The international focus on the ongoing COVID-19 pandemic has seen a reduction in childhood vaccinations. Owing to disruptions in immunization services, reduced outreach, funding shortfalls, and vaccine misinformation, a staggering 23 million children failed to receive basic childhood vaccines [1]. This number is 3.7 million more than in 2019, and the highest since 2009 [1]. As polio vaccination is among the standard immunization procedures administered to children, this statistic also reflects a global reduction in immunization rates against polio. In 2019, before the COVID-19 pandemic had begun, the global polio immunization coverage amongst 1-year-olds had reached 86%, the highest ever [2]. In 2020, however, when COVID-19 reached a pandemic status, these numbers saw an abrupt fall to 82% [2]. The trend continued in 2021, in which the coverage fell to 80% [2]. This is the lowest global polio immunization coverage since 2008.

Poliovirus immunization is carried out via oral or injected vaccines. While the Injected Poliovirus Vaccine (IPV) grants immunity via a killed specimen, the Oral Poliovirus Vaccine (OPV), which is the most commonly used, instead uses an inactivated virus with little to no virulence. The OPV's inactivated virus, however, can undergo mutations as it replicates in the gut. These mutations can rarely restore the virus's transmissibility as well as virulence [3]. These vaccine-derived variants, termed circulating Vaccine Derived Poliovirus (cVDPV) can then spread from person to person and cause infections no different from the naturally found Wild Poliovirus (WPV) in unvaccinated individuals. cVDPV can be further categorized into three different types based on the inactivated poliovirus strain that has undergone mutations. These are numbered as cVDPV1, cVDPV2, and cVDPV3. Among these, cVDPV2 is the most frequently transmitted. Fig. 1 highlights countries with new cVDPV and WPV cases in 2022.

Abbreviations: IPV, Injected Poliovirus Vaccine; OPV, Oral Poliovirus Vaccine; cVDPV, circulating Vaccine Derived Poliovirus; WPV, Wild Poliovirus; WHO, World Health Organization; GPEI, Global Polio Eradication Initiative.

The reduced polio immunization coverage has been accompanied by an increment in the emergence of both WPV and cVDPV worldwide. In 2019, a total of 378 cases of cVDPV were reported across only 19 countries [4]. Following this, between January 2020 and April 2022, a report by the CDC found that 33 countries reported 1,856 cases of cVDPV [3]. The majority of these cases involved cVDPV2, with 1081 and 682 cases of cVDPV2 in 2020 and 2021 respectively [4]. Meanwhile, cVDPV1 was responsible for 35 and 16 cases in 2020 and 2021 [4]. As of this report, in September 2022, 14 countries have had 247 new cVDPV cases, including the United States of America [5]. 10 of these are cVDPV1 cases, while 236 are cVDPV2 [4]. The only case of cVDPV3 was reported in Israel [4].

To combat the spread of polio, the World Health Organization (WHO) launched the Global Polio Eradication Initiative (GPEI) in 1988. Since then, two of the three strains of Wild Poliovirus (WPV), WPV2 and WPV3, have been successfully eradicated, reducing WPV cases by approximately 99.99%, with the number of cases going down from over 350,000 in 1988 to just six in 2021 [6]. The GPEI has successfully eliminated WPV in all except two countries - Pakistan and Afghanistan. Together, the two countries have reported 16 WPV1 cases so far in 2022 [7]. 15 of these were in Pakistan and 1 in Afghanistan [7]. It is thus evident that the two nations have faced difficulties in conducting immunization drives in polio-endemic areas. These can be attributed to two factors: Political unrest and civilian refusal to comply with vaccination attempts.

The political unrest in Afghanistan rendered vaccination inaccessible to children, a result of the ban on house-to-house Supplementary Immunization Activities since May 2018 [3]. In addition, non-compliant areas have a history of attacking polio vaccination teams due to the myths that envelop immunization. These myths also increase the number of vaccine-hesitant parents, further reducing vaccination rates. Another important reason for this aversion to immunization is security. Many polio-endemic areas regularly find themselves subjected to death threats from nearby militant groups. These groups perceive vaccination efforts as intelligence-gathering attempts, dissuading citizens from complying with immunization teams.

The majority of cVDPV cases were reported in regions of Africa and Asia, in countries such as Nigeria, Chad, Yemen, and the Democratic Republic of the Congo. However, In July 2022, a young adult in the US was diagnosed with paralysis caused by cVDPV2 [5]. This is the country's first reported case since 2013 and is not the only reoccurrence of cVDPV2 this year. In June, the UK, where poliovirus was eradicated in 1984, reported traces of genetically related cVDPV from

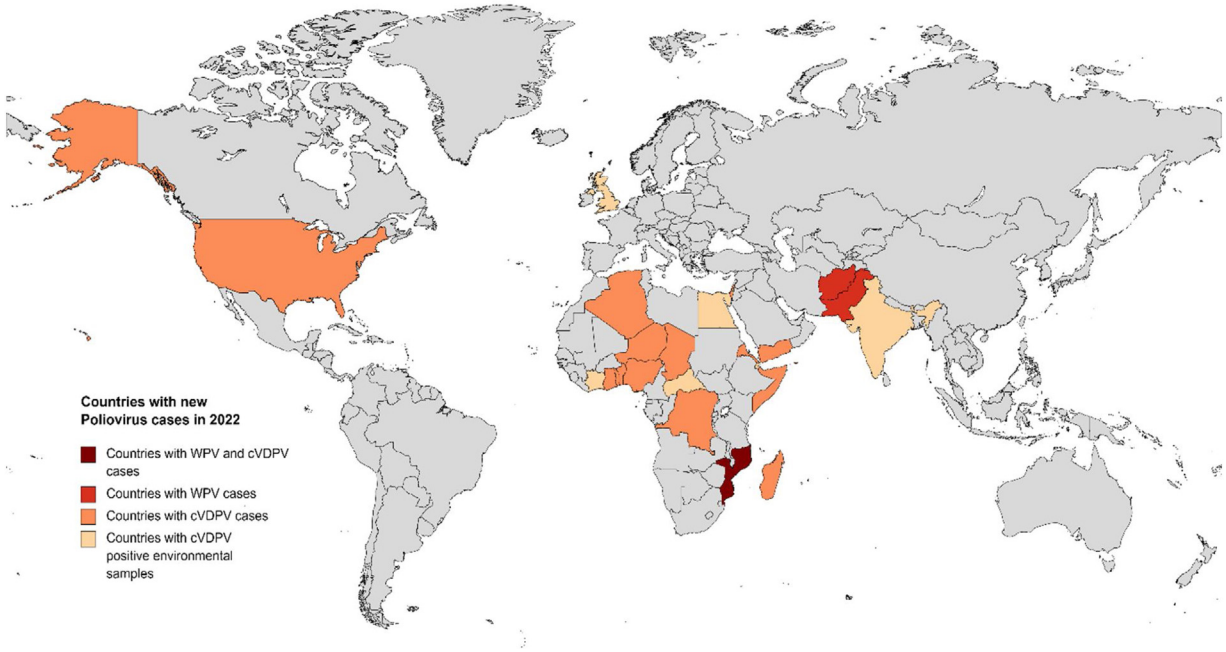

Figure 1. Countries with new Poliovirus cases in 2022.

sewage samples in London. Although no cases have been reported, the similar genetic makeup indicates the strong possibility of person-to-person spread. India found itself in a similar situation earlier this year, with cVDPV being detected in sewage from Kolkata despite its eradication in 2014. With this re-emergence of cVDPV in countries free from its grasp for nearly a decade, the question arises: Why? The answer, as has always been for the topic of polio eradication, is immunization.

Covid-19-induced lapses in surveillance, reduced available staff and hospital capacities, as well as funding, have had an effect even in the UK, where only 35% of teenagers received the routine polio booster dose in 2021 [8]. Now, as the pandemic slows down, and resurgences of vaccine-preventable diseases occur around the world, the reality of the situation is quickly becoming clear as cVDPV is not the only variant of polio undergoing a resurgence. Malawi and Mozambique, two countries that eradicated poliovirus in 1992 and 1993 respectively, have reported cases this year [9,10]. The fact that these outbreaks, which can be called side effects of the Covid-19 pandemic, are already palpable, hints at a dire future. Any country with similar vaccination rates of < 80% is thus vulnerable, its population at risk of debilitating paralysis [9,10].

Even with the presence of ever-improving vaccines, the solution lies not with the equipment but its use. As ever, the key to reaching global polio eradication is immunization coverage. To get there, countries must recognize the potentially debilitating effects, both physical and economic, that the virus can have on a population. Myths surrounding the vaccines must be debunked, and stricter implementation of vaccination drives encouraged. Missed immunizations from the recent past must be covered, and Covid-19-induced laxity is made up for. These initial findings can thus serve as warnings of a future outbreak. One which, with enough preparation, can be weathered better than in recent times.

Human and animal rights

The authors declare that the work described has not involved experimentation on humans or animals.

Informed consent and patient details

The authors declare that the work described does not involve patients or volunteers.

Funding

This work did not receive any grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author contributions

All authors attest that they meet the current International Committee of Medical Journal Editors (ICMJE) criteria for Authorship.

Disclosure of interest

The authors declare that they have no competing interest.

References

[1] Covid-19 pandemic leads to major backsliding on childhood vaccinations, new WHO, UNICEF data shows. https://www.unicef.org/press-releases/covid-19-pandemic-leads-majorbacksliding-childhood-vaccinations-new-who-unicef-data.
[2] GHO | By category | Polio (Pol3) - Immunization coverage estimates by WHO region. WHO https://apps.who.int/gho/data/view.main.81605?lang=en.
[3] Rachlin A, Patel JC, Burns CC, Jorba J, Tallis G, O'Leary A, et al. Progress toward polio eradication — Worldwide January 2020-April 2022. Morb Mortal Wkly Rep 2022;71:650—5.

[4] GPEI-Circulating vaccine-derived poliovirus. https://polio-eradication. org/polio-today/polionow/this-week/circulating-vaccine-derived-poliovirus/.
[5] Jazeera A. What to know about polio and the first US case in nearly 10 years. https://www.aljazeera.com/news/2022/7/22/what-to-know-about-polio-and-the-first-us-casein-nearly-a-decade-explainer.
[6] Poliomyelitis (polio). https://www.who. int/health-topics/poliomyelitis.
[7] GPEI-This Week. https://polioeradication. org/polio-today/polio-now/this-week/.
[8] Devlin H, Stewart H. Low polio vaccination rates among teenagers risks 'virulent infection'in UK. The Guardian 2022.
[9] Wild poliovirus type 1 (WPV1) - Malawi. https://www.who.int/emergencies/diseaseoutbreak-news/item/wild-poliovirus-type-1-(WPV1)-malawi.
[10] Wild poliovirus type 1 (WPV1) — Mozambique. https://www.who.int/emergencies/diseaseoutbreak-news/item/2022-DON395.

F. Niaz[a], S. Tariq[a], M.S. Rana[b], A.J. Nashwan[c,*], I. Fatima[a], Y. Afzal[a], R. Tariq[a]

[a] *Dow Medical College, Dow University of Health Sciences, Karachi, Pakistan*
[b] *National Institute of Health, Islamabad, Pakistan*
[c] *Hamad Medical Corporation, P.O. Box 3050, Doha, Qatar*

* Corresponding author.
E-mail address: anashwan@hamad.qa
(A.J. Nashwan)

Received 19 November 2022;
accepted 20 November 2022
Available online 24 November 2022

https://doi.org/10.1016/j.jemep.2022.100858